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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/701,075	11/05/2003	Bertil Hok	0715.0007C	6305
27896	7590	06/16/2005	EXAMINER	
EDEL, SHAPIRO & FINNAN, LLC 1901 RESEARCH BOULEVARD SUITE 400 ROCKVILLE, MD 20850			CYGAN, MICHAEL T	
			ART UNIT	PAPER NUMBER
			2855	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/701,075

Applicant(s)

HOK ET AL.

Examiner

Michael Cygan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The objections to the drawings based upon lack of illustration of the subject matter of claims 13-15 are withdrawn, since applicant's response indicated that the features of claims 13-15 are conventional features which would be known in the art in the claimed configuration. See page 7 of the applicant's response filed 06 May 2004.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 7, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tom (US 6,295,861 B1). Tom discloses the claimed invention, a sensor comprising a housing [34] having two cavities [44,45], each having within a resonating quartz crystal (inherently semiconductive) composed of compliant elements [12,14] and inertial elements [18,20,22], having means for exciting the crystals and comparing the output signals to determine the relative gas content of the cavities, having a flow controlling pump [118], and a filter (column 10 lines 7-15). The sensor signal is dependent on the weight

of absorbed gas, which is dependent on the molecular mass and density of the ambient gas. The speed of sound of a gas (i.e., an acoustic characteristic) is dependent on the molecular mass and density of a gas. Therefore, the sensor is dependent on the acoustic properties of the gas; gases having different acoustic properties will cause different sensor signals. The crystal (by itself) does not interact on a molecular level with the gas (any more than generic matter interacts on a molecular basis). See entire document, especially Figures 1-3 and column 6 lines 21-65.

3. Claims 1-5, 7, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Robinson (US 2,952,153). Robinson discloses the claimed invention, a sensor comprising a housing [56] having two cavities [16,36], each having a resonant frequency dependent on the density and velocity of sound of gas therein (column 2 lines 5-34 and column 3 lines 45-51), excitation means comprising compliant membranes [22,24,42,44] held by inertial frame members (Figure 1), and means for comparing output signals to determine a frequency change (Figure 1; column 4). A filter, and ambient air control means [68], may be used (column 8 lines 59+). The sensor comprises electronics which inherently comprise semiconductive materials (column 7).
4. Claims 1-6, 12-14, 17, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Morison (US 4,255,964). Morison discloses the claimed

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invention, a sensor comprising a housing [10] having two cavities [18,34], each having a resonant frequency dependent on the density and velocity of sound of gas therein (column 4 lines 4-9 and 45-48), excitation means comprising compliant transducers [20,24,42,38] held by perforated supports [22,26,38,42] (column 2 lines 1-23), and means for comparing output signals to determine a frequency change (Figure 1; columns 2-3). Ambient air control means may be used (Figure 1 and column 5 lines 27-60). The reflection of waves (column 4 lines 17-44) creates a standing wave pattern forming a Kundt resonator. The sensor comprises electronics which inherently comprise semiconductive materials (Figure).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 2, and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bowers (US 6,321,588 B1) in view of Potyrailo (US 6,684,683 B2). Bowers discloses a sensor comprising a housing [100] having an array of SAW sensors comprising piezoelectric crystals (inherently semiconductive), having means for exciting the crystals and comparing the output signals to determine the relative gas content of the cavities, having a flow controlling pump [420], and a filter [440]. The oscillators are comprised of ASICs integrated onto a single chip and having a component [130] for digital communication with a microprocessor [150]. See entire document, especially Figures 1 and 4 and columns 4-5. The sensor signal is dependent on the weight of absorbed gas, which is dependent on the molecular mass and density of the ambient gas. The speed of sound of a gas (i.e., an acoustic characteristic) is dependent on the molecular mass and density of a gas. Therefore, the sensor is dependent on the acoustic properties of the gas; gases having different acoustic properties will cause different sensor signals. The crystal (by itself) does not interact on a molecular level with the gas (any more than generic matter interacts on a molecular basis).

Bowers discloses the claimed invention except for multiple cavities and a micromachined silicon structure. Potyrailo teaches a sensor for gases having multiple cavities bordered with a semipermeable membranes and each containing a gas sensor such as a SAW or an equivalent sensor such as a cantilever "or the like"; see Figure 7 and column 3. It would have been

obvious to one having ordinary skill in the art at the time the invention was made to use multiple cavities as taught by Potyrailo in the invention taught by Bowers to form the array, since Potyrailo teaches the advantage of chemical specificity. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use cantilevers as taught by Potyrailo in the invention taught by Bowers to form the array, since Potyrailo teaches that such elements are interchangeable, and the use of each would gain any advantages of the particular form.

With respect to claim 8, it is notoriously well known in the gas sensing art to use cantilevers made of micromachined silicon, and their use in the invention described above would have been obvious to one having ordinary skill in the art in order to utilize their well known properties having well known advantages.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morison (US 4,255,964) in view of Fischer (GB 2,288,660 A). Morison teaches the claimed invention except for use of a Helmholtz resonator. Fischer teaches a gas density sensor using a Helmholtz resonator. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a Helmholtz resonator as the resonating cavity, since the Helmholtz effect is old in the art and known to provide uniform,

reliable gas density-resonant frequency relations, with the additional advantage of having no moving parts which could break or wear.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morison (US 4,255,964) in view of Granstedt ("New CO₂ Sensor with Fast Resolution and Fast Response", October 2001). Morison teaches the claimed invention except for a microacoustic resonator. Granstedt teaches the use of a Kundt resonator for gas density sensing, and teaches the desirability of miniaturization of such a sensor device; see page 3101 first paragraph and page 3102 second column. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a miniaturized Kundt (microacoustic) device as taught by Granstedt in the invention taught by Morison, since such would provide the advantages of new applications of the technique.

Response to Arguments

8. Applicant's arguments filed 06 May 2005 have been fully considered but they are not persuasive. With respect to the rejections based upon Tom, applicant argues that the resonator of Tom is not dependent on a "acoustical characteristic" as claimed, but is instead dependent on adsorption on the resonator. However, since the QMB sensor of Tom depends on the mass loading of the sensor (see column 10 lines 16-63), and the amount of

adsorption depends on the amount (concentration) of gas filling the chamber, the resonating structure of Tom depends on the molar mass and density of the gas. The mass and density of a gas are directly related to the speed of sound in a gas. Therefore, the resonating structure of Tom has a resonant frequency which is dependent on the acoustic characteristic (mass and density) of the gas. The same argument holds for the rejections based upon Bowers in view of Potyrailo.

9. With respect to the "micromachined" limitation of claim 1, this limitation converts the claim into a product by process claim. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Here, no limitation as to a different structure resulting from "micromachining" was set forth in the claim.

10. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a

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reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Since all of the patents are directed toward gas density sensing, the combinations are properly made with the motivations provided in the rejections.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cygan whose telephone number is (571) 272-2175. The examiner can normally be reached on 8:30-6 M-Th, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



MICHAEL CYGAN, PH.D.
PRIMARY EXAMINER